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CIRCULAR NO. 7.

# United States Department of Agriculture,

## SECTION OF FOREIGN MARKETS.

[Under the immediate supervision of the Secretary of Agriculture.]

### EXTENSION OF MARKETS FOR AMERICAN FEED STUFFS.

A communication of Mr. Newton B. Ashby, United States consul at Dublin, Ireland, under date of November 11, 1895, transmitted to the State Department for the consideration of the Department of Agriculture, contains a suggestion as to how the markets of the United States for feed stuffs may be greatly enlarged, and in furtherance of this suggestion this circular is offered for the information of those interested.

### PREPARATION OF FEEDING STUFFS FOR FOREIGN MARKETS.

Mr. Ashby's suggestion on this important subject is as follows :

When in Washington last summer I talked with various officials of the Department of Agriculture in reference to the extension of our markets for Indian corn or maize as a feed stuff. I promised at that time to report to the Department any plans which should occur to me as feasible for the further extension of our markets in the lines indicated. A plan has occurred to me which seems feasible and worthy of consideration by those engaged in milling and the grain export trade.

The difficulties in the way of the American maize trade are twofold : In the first place, maize, or Indian corn, is not as widely used by Europeans for feeding purposes as its value in the feed ration, considered in reference to comparative cost, merits. The farmers of Great Britain and Ireland could use maize in a much larger measure for finishing fattening animals, for production of dairy products, and for feeding horses, than they do ; the reason for the lack of wider use being partly because of their lack of knowledge of its feeding value, but more largely from their lack of the knowledge how to feed maize with their more common and cheaper feed stuffs in such a way as to get a properly balanced ration.

In the second place, our maize comes in competition with Danubian and Black Sea maize. For instance, in 1894 the port of Dublin received by direct import nearly 2,000,000 hundredweight of maize, of which only 6.5 per cent was from the United States, although the maize from the corn belt of the United States is, in my opinion, of better feeding value, pound for pound, than the Asiatic and European variety because of the hard, flinty character of the latter.

My idea is that both of these difficulties may be overcome in a large

measure by a single expedient. The British and Irish farmers, feeders, and dairymen are familiar with feeding stuffs in the form of cakes, as decorticated, cotton seed, and linseed cake. Let our millers prepare a balanced ration composed of a mixture of maize, oats, oil cake, and wheat, when the cheapness of the latter permits, the ingredients mixed thoroughly in their proper proportions, ground and pressed into cakes. It should be prepared as a balanced ration to be fed in connection with native-grown forage and fodder crops, and to meet the wants of distinct classes of consumers, namely: (1) For fattening purposes, (2) for dairy purposes, (3) for horse food. The consular service could readily put millers and exporters in possession of the character of the cheaper feedstuffs in use in the various districts and countries to which they are accredited, and with this knowledge the Government and State Experiment Stations could readily work out the requisite ratio of the mixture.

It seems to me that the conditions of our country are unrivaled for producing a balanced feed ration, as suggested in the foregoing paragraph; the farmers west of the Mississippi who produce the commercial maize and oat crops, one year with another, do not realize at the railway station or elevator more than 60 cents a hundred for oats and 40 cents a hundred for corn. In Ireland the farmer very rarely realizes less than \$1.10 to \$1.15 per hundred pounds of oats. Yet our cheap oats are not exported to any extent because of their great bulkiness to weight. A ration composed of a mixture of maize and oats as its chief ingredients could probably be prepared and put upon the market cheaper than any feedstuffs now in the market, feeding value considered. Preparing it in the form of cakes would increase the shipping facilities, and doubtless it could be put in such form as to have an advantage over maize itself in shipment. It would also have the advantage of furnishing to consumers the product in a form with which they are already familiar. The ration should, of course, be guaranteed as to its purity and as to the approximate proportion of albuminoids, etc.

Should this plan as outlined prove practical it would indirectly greatly benefit the American flour trade. As is well known the millers of Great Britain and Ireland are restricted very largely in their milling operations to the markets they can find for the by-products, and the successful carrying out of this scheme would undoubtedly greatly restrict their market for bran.

#### SUGGESTED FORMULAS FOR FEED CAKES.

The suggestion of Mr. Ashby seems to be a good one. Since we have in this country in linseed cake, and especially in cotton-seed cake, an almost unlimited supply of the richest nitrogenous food, which can not be used to the best advantage without mixing, it would seem very desirable to compound these substances with maize meal or some of the mill feeds, of which we also have a large surplus. If a cake could be made of two or more materials which would form a complete ration it might prove very convenient for the foreign feeder, and it is possible that in this way a market might be created for maize, wheat, and oat products, as well as for cotton-seed and linseed cake which we could not reach in any other way.



The object of this circular is to suggest to millers of maize, wheat, oats, and rice, and to oil mills producing cotton-seed and linseed cake that they make some experiments in producing mixed cakes for the purpose of seeing how they will keep, stand transportation, and meet the requirements suggested above. Meals like maize meal, wheat bran, rice polish, etc., are bulky and do not keep well, especially after a sea voyage. If mixed with an oil meal and pressed, the resulting cake could doubtless be transported more conveniently and would keep longer.

It is probable that some adhesive material like molasses would be necessary in order to make a solid cake of the mixed meals. Such molasses can be obtained from the sugar mills in Louisiana and Texas, where it is a waste product, for the cost of barrels and transportation. The beet-sugar factories have a similar product, and it is possible that a cheap sorghum molasses could be produced in sufficient quantity if there were a demand. Either one of these kinds of molasses would add to the feeding value of the cake and would probably also improve its keeping qualities. It is believed that only about 10 per cent of molasses would be required in order to make a solid cake.

The cake should be pressed in convenient forms for transportation and might be divided by grooves, so that it might be broken into smaller masses of a suitable size and weight, which could then be crated or strapped together in bundles of convenient size for handling, and would probably require little, if any, covering. If a covering is required or will add to the keeping qualities of the cake, one could doubtless be made from cheaper kinds of straw board or paper, which might be oiled to assist in excluding the air.

The following formulas are suggested :

*No. 1.—Maize and cotton-seed cake.*

This cake is composed of two-thirds maize meal and one-third cotton-seed meal, and the mixture would have approximately the following composition :

Substance.	Total.	Digestible.
	<i>Per cent.</i>	<i>Per cent.</i>
Dry matter.....	87.3	.....
Protein.....	20.2	17.0
Carbohydrates.....	56.8	49.0
Fat.....	6.9	6.4

This would form with hay a complete feed for cows, steers, and oxen. It would cost about \$15 per ton at the present prices of maize and cotton-seed cake at such points in the cotton country as Savannah, Memphis, New Orleans, and Houston, or such points in the Western corn country as Kansas City or Omaha.

No. 2.—*Maize and wheat-bran cake.*

This mixture is composed of three-fourths maize and one-fourth wheat bran. Such cakes would have approximately the following composition :

Substance.	Total.	Digestible.
	<i>Per cent.</i>	<i>Per cent.</i>
Dry matter.....	88.8	.....
Protein.....	11.6	8.3
Carbohydrates.....	69.9	59.2
Fat.....	4.8	3.2

This would be useful for horses and would cost about \$13 per ton at present prices at Kansas City, Omaha, or Minneapolis.

No. 3.—*Maize and oat cake.*

A cake composed of equal parts of corn and oats ground together and pressed would have approximately the following composition :

Substance.	Total.	Digestible.
	<i>Per cent.</i>	<i>Per cent.</i>
Dry matter.....	89.0	.....
Protein.....	11.1	8.1
Carbohydrates.....	70.7	56.8
Fat.....	5.0	3.7

This would be a very excellent and complete grain feed for horses. It would cost about \$13 per ton at the present prices at points in Illinois or the West.

No. 4.—*Maize and linseed cake.*

This is composed of three-fifths maize meal, one-fifth linseed meal, and one-fifth wheat bran. It would have approximately the following composition :

Substance.	Total.	Digestible.
	<i>Per cent.</i>	<i>Per cent.</i>
Dry matter.....	89.0	.....
Protein.....	16.0	12.2
Carbohydrates.....	66.0	54.6
Fat.....	4.4	3.1

This would seem a most admirable feed for growing pigs and calves. It might also be used for animals at hard work. It would cost about \$14 per ton at present prices at points in the Northwest.

Similar formulas can be suggested, if desired, for using various other products, such as rice polish (the outer coating of rice taken off at the

rice mills) maize "germs," gluten meal, and similar by-products turned out in the preparation of grains for brewing or for use as cereal foods.

It is hoped that these formulas, in connection with Mr. Ashby's suggestions, may be of assistance to such enterprising grain millers or oil-seed millers as may desire to make experiments in pressing or otherwise preparing and marketing products which are now going to waste or for which there is no sufficient demand at present.

#### EXPORTS OF OIL CAKE.

The enormous exportation of oil cake and oil-cake meal from the United States for the fiscal years ending June 30, 1893, 1894, and 1895 is shown by the following table :

1893.		1894.		1895.	
Pounds.	Dollars.	Pounds.	Dollars.	Pounds.	Dollars.
802,416,067	9,688,773	744,603,229	8,807,256	733,652,495	7,165,587

The following condensed table shows the export of oil cake and oil-cake meal for the fiscal year ending June 30, 1895 :

Country.	Pounds.	Dollars.
United Kingdom of Great Britain and Ireland.....	324,766,185	3,216,971
Germany.....	259,053,008	2,339,885
France.....	7,797,491	70,977
Other Europe.....	124,882,269	1,327,696
British North America.....	4,233,041	45,386
West Indies and Bermuda.....	12,544,931	159,765
South America.....	288,336	3,825
Other countries.....	87,234	1,082
Total.....	733,652,495	7,165,587

Since these oil cakes or meals are never used for feeding alone, but are always combined with other grains and fodders for making a completely balanced ration, suitable for the particular purpose, which may be either growth, flesh, fat, milk, or support of animals at work, we should aim to make them the carriers for other grain feeds which we have for sale in great abundance. The foreigner takes our oil cake eagerly because it is so rich in flesh-forming food and so cheap, but he does not take our grains, because he can grow them himself or get them elsewhere. By mixing proper proportions and pressing and packing them in convenient forms, the American miller may possibly make it to the interest of the British or European feeder to buy a large amount of our surplus cereal products along with his oil cake. If we could, for example, by making a mixed cake of two-thirds corn and one-third oil meal, find a market for this additional corn, it would be a large gain to us. If we



made all of our oil cake into mixed cake of this kind, instead of selling 800,000,000 pounds, or 400,000 tons of 2,000 pounds of pure oil cake abroad, worth about \$9,700,000, we would sell 1,200,000 tons worth \$24,000,000, at our seaboard (\$15 per ton plus freight to seaboard from inland mills at \$5 per ton)—a gain of \$14,300,000 in foreign markets for our grain producers, millers, and oil mills.

#### ANALYSIS OF BLACK SEA AND DANUBIAN MAIZE.

An analysis of maize from the Black Sea and the Danube, sent by Mr. Ashby, and referred to above, was recently made in the Division of Chemistry of the United States Department of Agriculture with a view to determining its comparative value as a feeding stuff with that grown in this country. The samples were found to correspond in composition to poor corn grown in the United States, being from 13 to 17 per cent lower in protein and fully 33 per cent lower in fat than the averages of over 200 samples of American-grown maize. While an average for maize the world over shows but 9.45 of protein, and this average is higher than samples from the Black Sea and the Danube, the American average is 10.5. Samples of dent and flint corn exceeded this, many indeed exceeding 11 per cent. So with fats, the general average being but 4.29; the average for corn grown in southeastern Europe is 4.13, while the average for American corn is 5.4, and many samples of the latter showed 5.5 and 6 per cent. The American average as given, moreover, includes numerous samples of inferior maize and can not be said to fairly represent the average of maize exported, which is usually our very best.

The quality of our American-grown maize as compared with that grown elsewhere is illustrated by the following data taken from Dietrich & Konig's very reliable compilation, the American average being from Jenkins & Winton's compilation :

	Water.	Protein.	Fat.	Nitrogen-free extract.	Fiber.	Ash.
	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
American-grown corn, American analyses.....	10.9	10.5	5.4	69.6	2.1	1.5
Average of 38 samples of Hungarian maize (1876).....	12.41	9.39	4.07	70.2	2.6	1.33
Average of 38 samples of Hungarian maize (1880).....	13.00	9.06	3.85	71.10	1.69	1.30
Black Sea maize.....	12.46	9.12	4.36	71.14	1.50	1.42
Average of corn grown in southeastern Europe (Roumania, Hungary, Turkey, Black Sea, Danube districts, etc.).....	13.35	9.42	4.13	69.37	2.34	1.39
Average of corn grown in southwestern Europe (Baden, Palatinate, Italy, Corsica, Burgundy, southern France, etc.).....	13.35	8.84	5.80	65.79	4.16	2.02
Dietrich & Konig's grand average for corn from all over the world..	13.35	9.45	4.29	69.33	2.29	1.29



While the above facts speak eloquently of the higher quality of the American product, they also testify with equal force to the importance of maintaining the high standard of the feeding quality of American maize in foreign markets, as that is unquestionably the characteristic upon which main reliance must be placed to enable the American growers to compete successfully with the cheap labor of southern Europe. The shipment of inferior grades of maize under the circumstances would be to deal a death-blow to American maize exports even to those countries where maize is used only as food for stock.

NOTE.—The purpose of the Section of Foreign Markets is to furnish information on the world's markets with special reference to increasing demands for American agricultural products. The bulletins of this section heretofore issued are as follows :

- Bulletin No. 1.—Great Britain and Ireland.
- “ “ 2.—The German Empire.
- “ “ 3.—France.
- “ “ 4.—Canada.
- “ “ 5.—The Netherlands.
- “ “ 6.—Belgium.

The above publications may be obtained of the Superintendent of Documents, Union Building, Washington, D. C., upon the payment of the price affixed thereto, viz, 5 cents per copy.